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ABSTRACT

This report is based on the analysis of initial interviews with the staff of the Freshmen Learning Community Program (FLCP) staff. FLCP is a pilot program in engineering education that focuses on diversity and cultural change. Data includes structured open-ended interviews and observations of discussion sections and learning program meetings. Evaluation findings indicate that in 1995 FLCP was moderately successful for a small subset of students. The program appears to foster a sense of group identity, providing students with a sense of belonging at the university. Findings also suggest a significant impact on student learning processes through the fostering of a collaborative learning approach. (DDR)

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Effects of a Learning Community Program on the First-Year Experiences of Engineering Majors

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Effects of a Learning Community Program on the First-Year Experience of Engineering Majors

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Abstract

Learning communities can potentially have a significant impact on the freshman student experience, particularly at large research institutions. Yet the implementation of learning communities at large universities poses many challenges. In Fall and Spring of 1995-96 the University of Wisconsin-Madison piloted the Freshmen Learning Community Program (FLCP), thus rising to meet these challenges. The Learning through Evaluation, Adaptation, and Dissemination (LEAD) Center, a third-party evaluation unit at the University of Wisconsin-Madison, conducted the evaluation of the FLCP. Evaluation findings indicated that the Fall 1995 Program was moderately successful for a small subset of the students in the FLCP. Based on the Fall evaluation findings several specific changes to the FLCP were implemented in the Spring 1996 program that resulted in more benefits experienced by a broader range of students. Evaluation findings indicate that the Spring Program was effective in addressing key problems faced by students at a large university. Most notably it functioned to "shrink the size" of the university in several ways. The program appeared to foster a sense of group identity, providing students with a sense of belonging at the University. It also had a significant impact on student learning processes primarily through fostering a more collaborative learning approach. This paper will explore the program development and the student experience in the Fall 1995 and Spring 1996 iterations of the program.

Introduction

Learning communities are programmatic efforts that purposefully create an academic and social community for students and instructors. Though there are multiple types of learning communities in higher education most of these models have in common that they involve students in a learning environment that emphasizes increased intellectual and social interaction among students. Research suggests that learning communities can potentially have a significant impact on the freshman student experience, particularly at large research institutions [1], [2]. Through providing students with the opportunity for increased interaction and shared inquiry, they foster the development of an academic and social support system as well as increasing student involvement in the learning process [3], [4].

In the Fall and Spring of 1995-96 UW-Madison piloted the Freshmen Learning Community Program (FLCP), a learning community model that enrolled a group of students in a cluster of courses. The FLCP was instituted in order to increase retention rates in the engineering major, particularly for women and ethnic minorities. The following Program goals were articulated: 1) to create the experience of a smaller college within a large university setting, 2) to foster collaborative learning among the students, and 3) to promote an understanding of interdisciplinary connections. The Program was evaluated by the University of Wisconsin-Madison's Learning through Evaluation, Adaptation and Dissemination (LEAD) Center during both semesters. Based on the evaluation findings from the fall semester, specific changes were instituted in the spring iteration of the Program. It was found that these programmatic changes produced markedly different outcomes for the students.

Evolution of the Freshmen Learning Community Program

FLCP Fall 1995: Implementation and Outcomes

The Fall '95 Program involved three learning community groups consisting of 20 students each who were co-enrolled in the same three large lecture classes introductory calculus, chemistry, and psychology. The Program was limited to pre-engineering majors. In addition to attending the same teaching assistant-led course discussion sections, all of the students in the learning community groups were encouraged to attend an optional weekly learning community meeting that primarily focused on introducing the students to the College of Engineering and assisting them in gaining access to services. As part of the calculus course,

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students engaged in assignments designed to help them understand the interdisciplinary links among the three courses. The Program was staffed by a Program Director and a Program Coordinator. The faculty members for the three courses, as well as the teaching assistants (TAs), did not play a major role in the implementation of the Fall Program.

Evaluation findings from the Fall 1995 semester indicate that for students who participated fully by attending the weekly FLCP meetings, the Program was effective in addressing key problems faced by students at a large university. Most notably it functioned to "shrink the size" of the university and foster a sense of belonging. However, because of Program implementation problems it was evident that many of the Program benefits were experienced by only a few of the students in the FLCP. This outcome was primarily linked to low student attendance at the weekly meetings. These meetings were critical to community formation because they facilitated students working together on coursework and interacting socially. Students indicated that they were not motivated to attend the meetings because they focused on issues that were unrelated to their current coursework. In addition, the goal of fostering interdisciplinary connections was not fully realized.

FLCP Spring 1996 FLCP: Modification based on evaluation findings

The Spring, 1996 FLCP retained the basic design of the Fall 1995 Program, but limited the course cluster to second semester calculus and chemistry. The Program was open to students of all intended majors and served two sections of 20 students each. Approximately 15% of the students who enrolled in the Spring Program had also participated in the Fall of '95.

Based on the Fall evaluation findings several specific changes to the FLCP were implemented in the Spring '96 Program. The weekly FLCP meeting format was changed to problem-solving sessions in which students worked in small groups on problem-sets from the two courses. (In this paper we refer to these as the "Tuesday afternoon meetings.") The TAs were paid an additional amount for their participation in the Program, and thus played a larger role in implementing the goals of the Program by helping to facilitate the weekly meetings and encouraging student interaction in their discussion sections. Although FLCP staff had planned to increase the emphasis on cross-disciplinary connections in the Program, this did not occur.

Spring 1996 Freshmen Learning Community Program Outcomes

Most of the students we interviewed in the Spring 1996 FLCP communicated that they felt they were truly part of a community. As such they expressed that they felt a sense of group identity and belonging. As previously noted, most students who were enrolled in the FLCP during Spring '96 were new to the Program. These students described a significant contrast between their social and academic experience during the Spring '96 semester as participants in the Program and their first semester at UW-Madison. Many of these freshmen described their adjustment to UW-Madison in the Fall of '95 as a difficult process in which they felt lost because of the size of the university and their classes. They indicated that joining the FLCP made adjusting to the UW easier and relieved their sense of academic and social isolation.

One of the defining features of this community for many students was a seamless integration between their social and academic lives. The students indicated that unlike their experience prior to participation in the FLCP, in the Program there was a high degree of interaction with other students. This facilitated their making friends as well as finding study partners. A few stressed that making close friends was one of the most important outcomes of the Program. In addition, the FLCP provided a forum where students with similar interests were able to get acquainted. The Program was particularly important for women because it allowed them to find other women with similar interests and career aspirations.

Students indicated that an essential characteristic of the FLCP community was a cooperative environment based on mutual concern. Primarily through the increased student interaction and collaboration students realized that they were not alone in their struggles with their coursework and began to feel comfortable with one another and to trust each other. As a result, students found it easier to ask questions in class. In addition, many students indicated that they were experiencing a shift from independence to interdependence in their learning process and that reliance on peers had become a key aspect of their learning process.

Participants of the Spring Program indicated that through their experience in the FLCP community, they were learning the value of groupwork. They reported that the FLCP had provided them with their first positive experience with groupwork, and that it had changed their attitudes about working with others. Through the FLCP many students came to realize that they did not have to complete their coursework entirely independently, but could rely on each other for help.

Students described the following effects of groupwork on their learning process. 1) groupwork reinforced understanding and increased confidence, 2) group discussions provided a foundation for independent learning, 3) students were more efficient through groupwork, and 4) groupwork generated more ideas and taught students to think and approach the material in new ways.

As the students made the shift from independence to interdependence in their learning process, their relationship to the TAs changed. Although the TA remained a crucial resource for the students, the students began to view their peers as important resources. In effect, their resource base became broader, and thus the TAs were not viewed as the sole authority. However, students still conceptualized the TAs as the dominant source of knowledge and often turned to them to "re-explain" the lecture, and to assist them when they were "stuck." Students expressed that another important difference in their relationship to the TA was that the Program allowed them to relate to their TAs on a more personal level. Because the TAs were involved in the FLCP and attended the Tuesday afternoon FLCP meetings, the students had more opportunities to interact informally with the TAs, making it easier for them to ask their TAs for help.

Changes in Implementation which Brought About Increased Program Outcomes: The Importance of Structure

The evaluation findings point to certain key structures of the Spring '96 FLCP as essential to fostering the goals of the Program. These structural features enabled the collaborative learning community to emerge and thrive. In this section we discuss each of the essential structural elements and the way in which they were important to the functioning of the learning community.

The TAs and the Program Coordinator were key implementers. In the Fall of '95 the Program Coordinator was the primary individual who was involved in the day-to-day activities of the FLCP. During the Spring of '96 the course TAs and the Program Coordinator worked together as a team to enact the Program goals. Three changes which were made to the Program ensured the involvement of the TAs: 1) they were paid an extra 5% to attend the weekly meetings, 2) they attended the pre-semester organizational meeting at which goals and strategies were discussed, and 3) the FLCP meeting format included problem-solving sessions in which the TAs had a prominent role. The TAs' participation was essential to the success of the Spring Program. They provided continuity between the courses and the Program by attending and encouraging students to attend the weekly meetings. To varying degrees, the TAs ushered the students into the Program in the discussion sections by orienting the them to the goals of the Program.

Co-enrollment: A small group of students with common ground. One of the most basic structures of the Program was co-enrolling students in the chemistry and the calculus courses. This provided the students with a small group with whom they could more quickly become familiar and comfortable particularly because they were in the same courses. This feature was not changed during the second implementation.

Weekly FLCP meetings an essential structure. Focal point of the community. During the Spring Program, the Tuesday afternoon meetings were a critical structure in fostering the key Program goals. Because students engaged in group problem-solving, they began to interact both socially and academically. Thus, the meetings fostered community formation and facilitated a groupwork approach to learning the course material. The meetings were generally attended by 50-90% of the students who were enrolled in the Program, and many students attended regularly. By contrast, during Fall '95 the attendance rate averaged approximately 15-20% of the students. The change in the meeting format from addressing general issues related to pre-engineers to focusing on coursework resulted in this increase in attendance. Through interviews with students it became clear that the primary reason why most students attended the meetings was because they felt that the meetings helped them to achieve one of their primary goals: to do well in their chemistry and calculus courses. Students who were involved in the FLCP during Fall '95 as well as Spring '96 confirmed that they did not go to the Fall meetings because they did not want to listen to speakers and that they were "just trying to get their homework done." An important feature of the meetings was that the students tended to work on graded homework problems which had been assigned for their chemistry course and were designed for groupwork. Thus, their participation in the meetings was tied to the reward structure of one of their courses. In addition, the TAs acted in a support role at the meetings and encouraged the students to be interdependent and less reliant on them for answers. The TAs' presence and support contributed significantly to the students' view that the meetings helped them to achieve their academic goals.

Chemistry 104: An essential structure which promotes the goals of the learning community. Certain features of the chemistry course made it an essential structure in creating the collaborative learning community in the Spring '96 FLCP. The Chemistry 104 professor emphasized the use of groupwork learning strategies and structured his course in such a way that students found it necessary to work in groups. In addition, the nature of the graded chemistry homework problems fostered a collaborative approach to learning. In part, it was through working on these problems in small groups, both inside and outside of the FLCP meetings, that students learned to rely on peers and to understand the value of groupwork. Without the chemistry course, the goals of the Program would have not have been achieved to such a high degree. Conversely, we suggest that the chemistry course operating without the other key Program structures would not have produced the learning outcomes and benefits that of the students in the learning community experienced.

It is important to note that although each of the structural elements discussed had a significant impact on fostering the goals of the Program, this only occurred because of the interaction among these elements. Each of the structural elements would not have had the same effect if they operated in isolation. These elements worked in conjunction with one another creating an integrated whole that was greater than the sum of the parts.

Data from both semesters indicated that Program goals for which there were no accompanying structures were not achieved. One such goal was fostering interdisciplinary connections between the two course content areas. Because students and TAs felt that the lectures, exams, and assignments for their courses did not emphasize and reward students for understanding interdisciplinary connections, they indicated that this goal could not take precedence over the more pressing goal of simply having the students understand the basic chemistry and calculus concepts.

A Processual Model of Educational Innovation

One view of educational reform projects that is subscribed to by some funding agencies is that these projects can achieve their goals and be implemented successfully in a short time frame. We posit that a continually evolving process of modification and change is a more appropriate model of educational reform. The development of the FLCP serves as an example of this processual model of educational reform. Through iterations this Program is in the process of more fully articulating its goals and creating program structures that are intended to enact those goals. As we have discussed this has involved a process of realizing that the original structural features of the program did not fully achieve the intended goals, thus requiring on-going modification of the program. Ongoing formative evaluation is a key component in this process because it provides critical information on the student experience assisting the implementers in determining whether they are meeting their goals.

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